



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/074,655

02/13/2002

Gerhard Brinker

P02,0032

6081

26574

7590

04/14/2006

SCHIFF HARDIN, LLP
PATENT DEPARTMENT
6600 SEARS TOWER
CHICAGO, IL 60606-6473

EXAMINER

TUCKER, WESLEY J

ART UNIT

PAPER NUMBER

2624

DATE MAILED: 04/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/074,655

Applicant(s)

BRINKER ET AL.

Examiner

Wes Tucker

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed January 20th 2006 has been entered and made of record.
2. Applicant has amended claim 1. No claims have been canceled. Claims 1-16 remain pending.
3. Applicant's remarks have been considered but are not fully persuasive for at least the following reasons:
4. Applicant has amended independent claim 1 to add the limitation of:
obtaining a single image using said imaging system, of at least three simultaneously-present markings having a known spatial position relative to each other.

Applicant argues that because Ausschnitt determines within level alignment and level to level alignment that the three markings having known spatial relationship relative to each other are not simultaneously present in a single image. Examiner disagrees and points to Fig. 5 and column 2, lines 38-42 and column 4, lines 56-65. Ausschnitt determines alignment using both level to level and within level after multiple levels are exposed. Therefore the alignment markings are clearly simultaneously present in a single image. The single image is shown in Fig. 5 showing simultaneously present alignment markings 50, 52 and 54, and the step of calculating alignment using multiple exposed fields in a single image is shown at Fig. 12, element 84. The image,

such as the image Fig. 5 contains the simultaneously present markings of different levels and uses those markings to determine alignment or distortion according to the expected positions of the markings.

With regard to independent claim 11, applicant alleges that Ausschnitt does not disclose a holder having markings. Examiner submits that the holder in Ausschnitt is simply whatever the markings are placed on and in Ausschnitt, that holder is the substrate on which the markings are placed.

Therefore the rejection previously presented is maintained and accordingly made FINAL.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,877,861 to Ausschnitt et al.

With regard to claim 1, Ausschnitt discloses a method for determining distortions in an image comprising the steps of:

arranging a subject in an imaging volume of an imaging system and obtaining an image of said subject in said imaging volume, with a first region of said imaging volume appearing undistorted in said image and a second region of said imaging volume appearing distorted in said image (Fig. 5). Ausschnitt discloses a method for calibrating an image system wherein, as seen in Fig. 5 distortions may occur in different portions of the image are distorted (elements 50 through the middle horizontal axis of the image) compared to the accurately aligned portions of the image such as the intersection of elements 50 52 and 54 in the top middle of the image.

Ausschnitt further discloses prior to obtaining said image of said subject, obtaining a single image, using said imaging system, of at least three simultaneously-present markings having a known spatial position relative to each other, with a first and a second of said three markings being disposed in said first region (Fig. 5, elements 52 and 54 in the top middle of the image) and a third of said three markings being disposed in said second region (Fig. 5, elements 50 in the middle horizontal axis). The desired position and relative location of said markings is known in order to calibrate the imaging system (column 5, lines 11-38 and column 6, lines 14-21).

Ausschnitt further discloses determining respective positions of said markings in said image of said markings (column 5, lines 25-38). The displacement of the markings relative to one another must be known to measure offset.

Ausschnitt further discloses determining an ideal position of said third marking in said image of said markings from the known spatial position of said third marking relative to said first and second markings (column 5, lines 14-21 and Fig. 5 elements 50

Art Unit: 2624

through the middle horizontal axis). Again the spatial relationships relative to one another must be known to calculate calibrations or errors.

Ausschnitt further discloses determining a positional difference of the image of the third marking in said image of said markings from said ideal position, and employing said positional difference as a criterion for distortion (column 5, lines 14-38). The displacement errors are calculated which inherently determines the difference between measured positions where distortions occur and where the actual known positions should be.

With regard to claim 2, Ausschnitt discloses a method as claimed in claim 1 comprising generating an imaging scale from the distance of the first marking in said image of said marking from the distance of said second marking in said image of said markings (column 5, lines 12-16). Ausschnitt discloses magnification errors, which is interpreted as the imaging scale. The scale must be known to uses the errors for correction.

With regard to claim 3, Ausschnitt discloses a method as claimed in claim 1 comprising arranging said three markings in a straight row behind one another (Fig. 5, elements 52, 50 and 54 on the right side are in a straight row.

With regard to claim 4, Ausschnitt discloses a method as claimed in claim 1 comprising determining said ideal positioning of said third marking by a straight line that proceeds through the image of said first marking and the image of said second marking in said image of said markings and by a known distance of said third marking from said first marking and said second marking (column 5, lines 11-38 and column 6, lines 14-21). The markings have known positions and relevant distances to one another and distortions are calculated when the actual imaged positions are different from the expected known positions.

With regard to claim 5, Ausschnitt discloses a method as claimed in claim 1 comprising arranging said three markings in a single plane (Fig. 5).

With regard to claim 6, Ausschnitt discloses a method as claimed in claim 5 comprising disposing the three markings at respective corners of a right triangle (Fig. 5). The markings in fig. 5 form right triangles using selected fiducials.

With regard to claim 8, Ausschnitt discloses a method as claimed in claim 1 wherein said image of said markings has a middle region, and obtaining said image of said markings so that said first region is disposed in said middle region of said image of said markings (Fig. 5, elements 50 in the middle horizontal axis).

With regard to claim 11, Ausschnitt discloses a calibration object for use in identifying distortion in an image of a subject in an examination volume, wherein said imaging volume has a first region that appears undistorted in said image and a second region which appears distorted in said image (Fig. 5) comprising:

a holder having three markings, a first and second of said three markings being disposed in said holder so as to be located in said first region of said imaging volume (Fig. 5, elements 52 and 50 in the middle vertical axis), and a third of said markings being disposed in said holder so as to be located in said second region (Fig. 5, elements 50 in the middle horizontal axis).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,877,861 to Ausschnitt.

With regard to claim 7, Ausschnitt discloses a method as claimed in claim 6, but does not explicitly disclose determining said positional difference by triangulation. The

Art Unit: 2624

elements of Fig. 5 are spaced in relatively orthogonal formation, which forms right triangle shapes. The method of finding distance using triangulation is well known in the art especially when certain distances are known and others are to be calculated.

Examiner takes Official Notice. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use triangulation to calculate desired distances in the method of Ausschnitt since certain distances are already known.

With regard to claim 9 Ausschnitt discloses a method as claimed in claim 1 wherein said three markings are arranged in a single plane and wherein said image of said markings has a center (Fig. 5, Fig. 2A), but does not explicitly disclose identifying the respective markings in said image of said markings from respective distances of the markings in said image of said markings from said center. It is obvious for registration images to have a center, especially in a symmetrical image in which desired distances are known relative to each other. Therefore it would be an obvious design choice to measure the markings from their relative distance to a center point or any point of relevance to better enable alignment of said image. Therefore it would have been obvious to one of ordinary skill in the art to use a designated center point to calculate known or desired distances for use in a symmetric registration image to better enable alignment.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patents 5,877,861 to Ausschnitt et al. and 6,235,038 to Hunter et al.

With regard to claim 10, Ausschnitt discloses a method as claimed in claim 1, but does not explicitly disclose comprising generating said image of said subject and said image of said markings by nuclear magnetic resonance imaging. However using fiducial markings to calculate distortion in any kind of image would be useful. Hunter discloses a system using electro magnetic and optical imaging to determine the difference in two sets of coordinates, the difference and alignment determined by fiducial markings on rigid bodies within the imaging volume. Therefore it would have been obvious to one of ordinary skill in the art to use markings in an MRI image in order to calibrate errors or displacement between imaged locations and known locations.

Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,877,861 to Ausschnitt in view of U.S. Patent 6,052,611 to Yanof.

With regard to claim 12, Ausschnitt discloses a calibration object as claimed in claim 11, but does not disclose wherein said holder has three cylindrical volumes therein, and wherein said three markings are formed by an imageable substance contained in said three cylindrical volumes. Yanof discloses a holder with three cylindrical volumes and wherein the markings are formed by an imageable substance

Art Unit: 2624

(Figs. 4 and 5). Yanof discloses a calibration phantom similar to that claimed in which cylinders are used (Fig. 4, elements 148). Such phantom volumes are well known in the art for calculating the difference in image coordinate systems. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use such a volume to align images with expected image coordinate values.

With regard to claim 13, Ausschnitt and Yanof disclose a calibration object as claimed in claim 12, and Yanof discloses wherein said cylindrical volumes are identical (Fig. 4).

With regard to claim 14, Ausschnitt and Yanof disclose a calibration object as claimed in claim 12, and Yanof discloses wherein said cylindrical volumes are disposed in a plane and are aligned perpendicularly to said plane (Fig. 4).

With regard to claim 15, Ausschnitt and Yanof disclose a calibration object as claimed in claim 12 and Yanof discloses wherein said third marking comprises two cylindrical auxiliary volumes oriented in a crossed arrangement (Fig. 4). The cylinders from perpendicular faces of the volume are interpreted broadly as oriented in a crossed arrangement.

With regard to claim 16, Ausschnitt and Yanof disclose a calibration object as claimed in claim 15, however neither Yanof nor Ausschnitt discloses wherein said third

Art Unit: 2624

marking additionally comprises a further cylindrical volume proceeding away from an intersection of said two cylindrical auxiliary volumes. However it follows that using the volume of Yanof that it would be a matter of design choice as to how and where the cylindrical volume are placed and where their elements intersect unless for a specific purpose as has yet to be disclosed in the present application. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a volume such as that of Yanof in the image alignment calculations of Ausschnitt with intersections and arrangements in the cylindrical structures as a matter of design choice unless they specifics of the intersections an arrangement are used for a specific purpose.

Conclusion

Applicant's amendment has not overcome the presented grounds of rejection presented in the Office Action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2624

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wes Tucker whose telephone number is 571-272-7427. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-2214. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wes Tucker

4-4-06



MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600